

Claims

1. A method for monitoring a flexible elongate structure comprising at least one layer of steel wires near the surface, the steel wires extending at least partly along the length of the structure, the method comprising inducing an alternating magnetic field much less than saturation in the steel wires using an electromagnetic coil, and monitoring the alternating magnetic flux density near the surface of the structure, determining from it a parameter indicative of stress in the steel wires, and hence detecting if any wires have broken.
- 15 2. A method as claimed in claim 1 wherein the magnetic field is in a direction at a non-zero angle to the longitudinal axes of the wires.
3. A method as claimed in claim 1 or claim 2 comprising the steps of arranging an array of electromagnetic stress sensing probes around the circumference of the elongate structure, and detecting a variation of the measured stress around the circumference.
- 25 4. A method as claimed in any claim 1 or claim 2 wherein a single coil is arranged to encircle the elongate structure, so that changes in stress in all the reinforcing wires are monitored simultaneously.
- 30 5. A method as claimed in claim 3 wherein each probe comprises an electromagnet means, means to generate an alternating magnetic field in the electromagnet means and consequently in the structure, and a magnetic sensor arranged to sense a magnetic field due to the electromagnet means; and the method comprises resolving signals from the magnetic sensor into an in-phase

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component and a quadrature component; and deducing from the in-phase and quadrature components a stress-dependent parameter that is independent of lift-off.

- 5 6. An apparatus for monitoring a flexible elongate structure by a method as claimed in any one of the preceding claims.

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